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THE EDUCATION 6G MODULS AND 2035 STRATEGIES FOR UNIVERSITIES IN UKRAINE AND VISEGRAD 4 COUNTRIES

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The University of Oulu, Finland and Japan National Institute of Information and Communications Technology (NICT) have agreed to cooperate in technology field. NICT is Japan's leading national research institute on ICT, so its role is not only in Japan but also are globally important in 5G and 6G development. The mix of technologies the development in 6G requires more expertise. Next, there is co-operation program between The University of Tokyo, Faculty of Engineering and University of Oulu in Finland, an initiative focused on groundwork for future 6G standards.

1. The United Nations Sustainable Development Goals

The United Nations SDGs are a way to frame the opportunities and challenges of a desirable future world, covering a wide range of topics such as ending poverty, building gender equality, fighting climate change and developing smart cities. The relationships between these potentially mutually reinforcing forces are currently poorly defined.

Based on the 6G vision and megatrend review, mobile communications and a new link between 6G and the UN SDGs is proposed by combining the UN SDGs with existing indicators. This coordination is done through a work on a new set of 6G-related metrics to guide research on 6G systems. This new alliance will be 6Gs envisioned 3 tiers of

1) service providers to guide and support communities and countries towards the achievement of the UNs SDGs

2) data collection and measurement tools to support indicator reporting. build on one role. Hyper-local granularity

3) a new ecosystem enhancer based on his 6G network of 6G technology enablers and networks developed in line with the United Nations SDGs that incorporate future mobile communication technologies that will be available in 2030.

Related challenges have also been identified. The Action Plan is presented with prioritized focus areas in the technological and industry evolution of the mobile communications sector to best support the

achievement of the UNs SDGs to identify megatrends that will impact 6G sustainable development.

Oolu University 6G Flagship research is organized into four interrelated strategic research areas that call for scientific breakthroughs in the development of the fundamental technical components of 6G systems:

1.1. Visions for 6G Wireless Intelligence

Developing products, services and vertical applications for a digitized society requires a multidisciplinary approach, and thinking of how data and services are created, delivered and consumed.

It covers many new terminology themes *[**Table: 1**]*.

Table: 1

The terminology in 5G and 6G projects

Chess RockEU2 –Europe-Two Robotic Coordination Actions 5G	CHAMPION – 5G Communications Over Heterogeneous Agile Mobile Networks at the Pyeongchang Olympic Winter Games	NextGEnergy – Next Generation Power for Autonomous Devices – Integrated Multi-Source Energy Harvester
LTCeramics – Cryogenic Ceramic Applications	Q -RAPIDS – Rapid, quality-conscious software development SaT5G – Satellite and terrestrial networks for 5G	TERRANOVA – Terabit/s wireless connectivity with innovative technology from TeraHertz to bring the quality of experience of optical networks to systems beyond 5G
SECREDAS – Cross-Domain Reliable and Trustworthy Cybersecurity of Automated Systems	CUTLER – Coastal Urban Development Through the Lens of Resilience	CoM_n_Play-Science – Learning science in a fun and creative way 5G-Enhance – 5G enhanced mobile broadband access networks in crowded environments
CS-AWARE– Cybersecurity situational awareness and information sharing solution for local governments based on advanced big data analytics	ARIADNE – 5G Artificial Intelligence-Assisted D-Band Networks for Long-Term Evolution CSI-COP – Citizen Scientists Investigating GDPR Compliance for Cookies and Apps	NEUROPA – Non-Invasive Dynamic Neural Control Rover with Laser-Based Technology – Validated Wireless Body Centric Trusted Technologies and Models for Transmission and Localization of Chameleon

RESTORE – User-Centric Smart Nanobiomaterial-Based 3D Matrix for Cartilage Repair 5G!Drones – Advanced Testing Unmanned Aerial Vertical Applications with 5G Facilities	GRAGE – European Gray and GREEN: Urban Elderly	NEWPACK – New Competitive and Sustainable Bio-Based
5G-RANGE – 5GRANGE 5th generation remote area access network	HYFLIERS – Hybrid Flying Rolling with-snakE-aRm Contact Inspection Robot	SLICES-SC – Scientific Large Scale Infrastructure for Computing/Communications
FUNCOMP – Manufacturing functional components at room temperature HTx – Access to medical technology and Next-Generation Medical Technology Assessment to Support Patient-Centric, Society-Oriented, Real-Time Decision-Making on Reimbursement	GREENEDGE – Mobile Network Environment with GREEN EDGE Computing Platform RESET – Equality and justice Hexa-X Redesigning Academic Excellence	Together – Flagship of B5G/6G Vision and Intelligent Fabric of Technology Enablers Connecting Human, Physical and Digital Worlds IDUNN – Cognitive Detection Systems for Cyber-Secure Operational Technology
PRINCE – Readiness Response to CBRNE INCidEnts Experimental Research – Initiating Communities Illusive – Fundamentals of Perceptual Engineering	ULTIMATE CERAMICS – Printed electroceramics with ultimate composition Commercialization of 6G communication system and UN Sustainable Development Goals (UN SDGs) both target 2030	P2P-Smart Test – Peer-to-Peer Smart Energy Distribution Network (P2P-SmartTest)
DELIGHT – Device-Centric Low-Complexity Radio-Frequency Network	PRIME-VR2 – Personalized Recovery with Multi-User Environments: Virtual Reality for Rehabilitation	FRACTAL – Cognitive Fractal and Secure EDGE Better Factory Based on Proprietary Open-Safe-Reliable-Low Power Hardware Platform Nodes – IntelIoT to grow the manufacturing industry – Intelligent, decentralized, human-centered and trustworthy IoT environment FF2020 – Creating a spatial ecosystem for the 21st century

Source: prepared by author M. Hoschek

1.2. University of Oulu 6G Projects

The Lens Antenna Tuning for Telecommunications and Imaging Modes in Sub-THz Radio Systems Oolu research focus on sub-THz frequency radio systems operating in dual mode by adjusting the lens-antenna distance in either communication or imaging mode *[1]*. Signal transmission and imaging capabilities are demonstrated using continuous wave operating trans receiver with an operating frequency of 220-330 GHz that can be assigned a 6G wireless radio system.

A high-gain bullet-shaped lens antenna was investigated for imaging a natural object (*Bergenia leaf*) over a short-range line-of-sight radio link. The Barrett lens operated with a gain of 28 dB and a beam width of 1° across the frequency band. A demonstration of dual-mode operation placed Leaf in the centre of the radio link path and utilized inverse synthetic aperture radar techniques to synthesize images of it with his three lenses to the antenna distance.

It is possible to switch from high-gain low-resolution mode to low-gain high-resolution mode by changing the lens position in terms of the feed. It can be applied to systems. It is used to reveal new potential functions of future radios. 5th generation wireless networks have not yet been fully explored, but the vision and key elements of the 6th generation (6G) ecosystem have already been discussed. To contribute to these efforts and to illustrate the security and privacy aspects of 6G networks, we investigate how security affects a conceived 6G wireless system and present possible challenges and solutions.

While 5G is rolling out and the economy and society are beginning to reap the benefits that come with it, the R&D. Related 6G flagship Oolu University publications operate at platform-based business model for future mobile operator business. Sustainability and spectrum management in the 6G era Security landscape overview for virtual, The comprehensive specification of a first set of concrete use cases for his 6G jointly defined by industry and academia, including large-scale twinning, collaborative robots, and immersive telepresence.

3.1. The Development Satellite and Terrestrial for 6G network

The 6G Drivers and UN SDGs 6G Research Visions led by Oulu University Commercialization of 6G communication systems and the United Nations Sustainable Development Goals (UN SDGs) are both targeted for 2030. 6G communications are expected to boost global growth and productivity, create new business models, and transform many aspects of society [4].

Here the SDGs for the United Nations are a way to frame the opportunities and challenges of a desirable future world, covering a wide range of topics such as ending poverty, building gender equality, fighting climate change and developing smart cities.

The relationships between these potentially mutually reinforcing forces are currently poorly defined. Based on the vision of 6G, and the review of megatrends, ongoing research on the relationship between mobile communications and the UNs SDGs and existing indicators, new links between 6G and the UN SDGs are proposed. This coordination is done through 6G-related metrics to guide research on 6G systems *[6]*. This new partnership will be her 6G envisioned as:

1) a service provider to guide and support communities and countries towards the achievement of the UN SDGs,

2) a data collection measurement tool to support indicator reporting. built on her three roles.

3) a new ecosystem enhancer based on 6G networks of 6G technology enablers and networks developed in line with the United Nations SDGs that incorporate future mobile communication technologies that will be available in 2030. Related challenges have also been identified *[7]*. The Action Plan is presented with prioritized focus areas in the technological and industry evolution of the mobile communications sector to best support the achievement of the UN SDGs.

Conclusion. As 5G enters the deployment phase, 6G Flagship will assist the global industry in completing the 5G standard, mainly through joint projects, trials and demonstrations. At the same time, Oulu University 6G flagship experts are already working hard on key technical components and solutions for the 2030 wireless era.

Wireless connectivity, device and circuit technology, distributed intelligence, and human-centric wireless services are his four interconnected strategic research areas within the 6G flagship. The main goal of 6G Flagship is to help enterprises conduct technology and system pilots to complete the 5G standard, develop the basic technical components required for 6G systems, accelerate the digitization of a robust and safe society.

Referencie:

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РОЗВ'ЗУВАННЯ ТРАНСПОРТНОЇ ЗАДАЧІ В СЕРЕДОВИЩІ SMATH STUDIO CLOUD ТА ЇЇ МАТЕМАТИЧНА МОДЕЛЬ

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Різні аспекти оптимізації займають важливе місце у бізнесі та діяльності сучасних організацій та підприємств. Проблеми оптимізації присутні у різноманітних процесах, які можна поділити на такі категорії: задачі з обладнанням, де потрібно знайти оптимальне розподілення асортименту виробів між окремими взаємопов'язаними машинами. Критерієм оптимальності цієї групи задач може бути прибуток, собівартість, кількість продукції, продуктивність праці тощо; задачі на суміші, де необхідно знайти оптимальну рецептуру різних сумішей.

Аналіз останніх досліджень і публікацій. Проблеми оптимізації та методи розв'язання задач лінійного програмування досить детально розглянуті в роботах Ашманова С., Романюка Т., Терещенко А. та ін.

Транспортна задача полягає у пошуку найбільш вигідного плану перевезення однорідного продукту з пунктів виробництва (чи зберігання) до пунктів споживання, тобто від постачальників до споживачів, ефективність якого будемо оцінювати за критерієм